CLAIMS

We claim:

1. A method for monitoring the condition of a fluid dielectric in an RF system comprising the steps of:

transmitting optical radiation through a portion of said fluid dielectric contained within a dielectric substrate of said RF system;

measuring at least one parameter indicative of a change of transmission direction of said optical radiation caused by said fluid dielectric.

2. The method according to claim 1 further comprising the step of selecting a material for said dielectric substrate to be a low temperature cofired ceramic.

3. The method according to claim 1 further comprising the step of comparing said change in direction to an expected change of direction for said fluid dielectric in a non-degraded condition.

4. The method according to claim 1 further comprising the step of calculating a refractive index of said fluid dielectric.

5. The method according to claim 3 further comprising the step of comparing said refractive index to an expected refractive index of said fluid dielectric in a non-degraded condition.

6. The method according to claim 1 further comprising the step of dynamically varying an angle of incidence of said transmitted optical radiation upon said fluid dielectric.

7. The method according to claim 6 further comprising the step of controlling a Micro-Opto-Electro-Mechanical System (MOEMS) to vary said angle of incidence.

8. The method according to claim 1 further comprising the step of selecting said optical radiation from the group consisting of infrared, ultraviolet, and visible light.

9. The method according to claim 1 further comprising the step of communicating a fault notification if a condition of said fluid dielectric is degraded.

10. The method according to claim 1 further comprising the step of determining a condition of said fluid dielectric based on said parameter.

11. The method according to claim 1 further comprising the step of modifying at least one operating parameter of said RF system if a condition of said fluid dielectric is determined to be degraded.

12. The method according to claim 11 wherein said at least one operating parameter that is modified is selected to compensate for an effect to said RF system caused by said fluid dielectric that is determined to be degraded.

13. An RF system comprising:

an RF circuit disposed on a dielectric substrate;

a fluid dielectric contained within said dielectric substrate;

a light source transmitting optical radiation through a portion of said fluid dielectric; and

a sensor measuring at least one parameter indicative of a change of transmission direction of said optical radiation caused by said fluid dielectric.

14. The RF system according to claim 13 wherein at least one of said light source and said sensor is embedded within said dielectric substrate.

15. The RF system according to claim 13 wherein said substrate is a low temperature cofired ceramic.

16. The RF system according to claim 13 wherein said processor compares said change of direction to an expected change of direction for said fluid dielectric in a non-degraded condition.

17. The RF system according to claim 13 wherein said processor calculates a refractive index of said fluid dielectric.

18. The RF system according to claim 17 wherein said processor compares said refractive index to an expected refractive index of said fluid dielectric in a non-degraded condition.

19. The RF system according to claim 13 further comprising a light steering device responsive to a control signal, said light steering device selectively varying an angle of incidence of said transmitted optical radiation upon said fluid dielectric.

20. The RF system according to claim 19 wherein said light steering device comprises a Micro-Opto-Electro-Mechanical System (MOEMS) device.

21. The RF system according to claim 20 wherein said MOEMS device is embedded in a dielectric substrate of said RF system.

22. The RF system according to claim 13 wherein said optical radiation produced by said light source is selected from the group consisting of infrared, ultraviolet, and visible light.

23. The RF system according to claim 13 wherein said processor transmits a fault notification if a condition of said fluid dielectric is degraded.

24. The RF system according to claim 13 wherein at least one operating parameter of said RF system is modified if a condition of said fluid dielectric is determined to be degraded.

25. The RF system according to claim 24 wherein said at least one operating parameter that is modified is selected to compensate for an effect to said RF system caused by said fluid dielectric that is determined to be degraded.

26. The RF system according to claim 13 further comprising a processor responsive to an output of said sensor, said processor determining a condition of said fluid dielectric based on said parameter.

27. The RF system according to claim 26 wherein said condition affects at least one electrical characteristic of said fluid dielectric.

28. The RF system according to claim 26 wherein said electrical characteristic is at least one of a permittivity and a permeability.